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ABSTRACT

Many studies of educational outcomes collect data on the socioeconomic characteristics of parents from students, and not from the parents themselves. Nevertheless, students are often fallible informants of parental status factors. A series of distinct hierarchical measurement models were used to examine the structure of errors in high school seniors' reports of parental socioeconomic status and compare the extent of these reporting errors between blacks and whites. Using data from "High School and Beyond (HSB)," a longitudinal study of United States sophomores and seniors, the analysis estimated the accuracy of reports of parental traits across races for both parents and senior students, then considered the extent to which reports of students matched those of parents. Finally, and more restrictively, the analysis compared the reliabilities of data reported by black and white parents and students. It was found that the reliability coefficients for students were significantly smaller in value than the reports of parents, and a fairly large covariance existed between the students' reporting errors of mother's and father's education. The errors with which black students reported their parents' socioeconomic characteristics were significantly larger and reliability coefficients were lower than those of white students. (Author/CM)

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HIGH SCHOOL SENIORS' REPORTS OF PARENTAL SOCIOECONOMIC STATUS: BLACK-WHITE DIFFERENCES

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ABSTRACT

Many studies of educational outcomes collect data on the socioeconomic characteristics of parents from students, not from the parents themselves. Nevertheless, students are often fallible informants of parental statuses. This paper investigates the structure of errors in high school seniors' reports of parental socioeconomic status, and compares the extent of these reporting errors between blacks and whites.

HIGH SCHOOL SENIORS' REPORTS OF PARENTAL SOCIOECONOMIC STATUS: BLACK-WHITE DIFFERENCES

Measurement error is insideous. It creeps into social data collection and analysis in devious ways, and its effect on substantive conclusions is more dangerous than superficially evident. This paper investigates one particular aspect of measurement error: the structure of errors in high school seniors' reports of parental socioeconomic status, and compares the extent of these reporting errors between blacks and whites.

Models of educational achievement often include measures of socioeconomic background in order to control for socioeconomic differences in assessing the effects of educational treatments. If, however, these background variables have been measured with substantial error, one's substantive conclusions will be affected. For example, if the background variables contain substantial random measurement error, their least-squares estimates on measures of educational outcomes will be less than their true effects, and the influence of educational treatments correspondingly inflated. The effects of intervening educational treatments will also be inflated in least-squares analyses if socioeconomic background variables have been measured with correlated errors; the association between manifest background variables will therefore be artifically inflated, thus permitting the educational treatment variable to explain more of the outcome variable than warranted in actuality.

Moreover, when the effects of treatments are estimated across groups, such as blacks and whites, differential amounts and kinds of

measurement error among background variables will have differential effects upon estimates of both the background variables and the treatments. As a result, one could be led to the conclusion that an educational treatment worked differently for blacks and whites, not because it truly did, but because of differential measurement error.

Many studies of educational outcomes have collected data on the socioeconomic characteristics of parents from students, not from the parents themselves. Nevertheless, students are often fallible informants of parental statuses. Students may guess in the face of uncertainty, or reconcile their uncertainty by substituting known information about one parent for unknown information about the other.

A few studies have addressed the problem of student's reporting errors of parental status, but none have adequately compared the measurement properties of status variables as reported separately by students and parents using a common framework for estimating models for whites and blacks simultaneously. Mason, et al. (1976) found that both white and black twelfth-grade students reported parental status characteristics as accurately as did their parents, but that neither black students nor their parents were as accurate in their reports as were whites. Unfortunately, Mason et al.'s (1976) analysis was deficient to the extent that they estimated models independently for each group. Mare and Mason (1980) corrected this deficiency in their examination of children's reports in the sixth, nineth, and twelfth grades, but they restricted their analysis to the white subpopulation, and did not compare whites and blacks with the more adequate methodology.

Wolfle and Robertshaw (1983) have applied this methodology--Joreskog's (1971) general framework for simultaneous covariance structure analyses of multiple populations--to a national sample of black and white high school seniors. They found that whites and blacks have an invariant factor pattern; that is, unit increases in true status characteristics led to the same increase in manifest measures for blacks as for whites. However, they also found that reliability estimates for whites were significantly higher than for blacks due to differences in true score and error variances. Their study, however, was restricted to multiple measures of parental status as reported by students, and they were never able to compare students' reports against those of the parents.

The present study explores racial differences in high school seniors' reports of parental socioeconomic traits using a multiple group measurement model suggested by Joreskog (1971). The analysis begins by estimating the accuracy of reports of parental traits across races for both parents and students. The analysis next considers the extent to which reports of students matched those of their parents. Finally, and more restrictively, comparisons are made of the reliabilities of black and white parents and students.

METHOD

Data for these investigations were taken from "High School and Beyond" (HSB), a longitudinal study of U.S. high school sophomores and seniors, sponsored by the National Center for Education Statistics. These data are described in a users' guide prepared by the National

Opinion Research Center (1980). In particular, these analyses were based on a subsample of HSB parents matched to their senior high school children. Both parents and children were asked to report the educational attainment of the mother and father, and the father's occupation. The analysis reported here was restricted to 1502 white and 99 black respondents who possessed complete reports for the six variables included in the measurement model.

The exact questions used in the original survey are available in the users' guide (National Opinion Research Center, 1980), but are summarized here. Of the variables included in this analysis, the seniors were first asked to categorize the job most recently held by their father. They were asked to choose one of seventeen categories (clerical, craftsmen, farmer, etc.); these responses were then recoded to their Duncan (1961) socioeconomic index equivalent scores as given in Levinsohn, et al. (1978, Appendix O, p. 11). The seniors were next asked to indicate the highest level of education completed by their father. A similar question was asked about their mother's education. These responses were then recoded to match the categories reported by the parents; the resulting scale ranged from 1 to 8, representing categories from less than high school (=1) to the receipt of a Ph.D. or M.D. degree (=8).

After the collection of the HSB base-year data from the high school students, 3197 parents of the HSB seniors were contacted and additional data collected, which concentrated primarily on the parents' plans for financing their children's higher education. Included in the

questionnaire, however, were questions dealing with parental socioeconomic characteristics. In about 60 percent of the cases, it was the student's mother who completed the questionnaire, while the student's father completed the questionnaire in the remaining cases (students who had some other adult complete the questionnaire, such as an aunt or grandfather, were excluded from these analyses). Parents completing the questionnaire were asked to report their occupation, their spouse's occupation, their education, and their spouse's education. These were recoded as appropriate to obtain a report of the father's education (as reported by either himself, or by his spouse), and mother's education. These were recoded to match equivalently the scale used by students to report their parents' education. The occupation question in the parent's survey was coded according to the U.S. Census Bureau's detailed occupation code. In order to match these responses with those of the high school seniors, the detailed occupational codes were collapsed into the identical categories used by the students, and assigned the same Duncan (1961) SEI scores. The correlations among these six variables, plus their means and standard deviations, are shown in Table 1 for both blacks and whites.

Insert Table 1 About Here

For each race, the basic measurement model used in these analyses can be described by a set of six equations in which both the parent's reports of their status and the children's reports of their parents' status

are seen to be caused by the parent's true status (an unmeasured latent factor). That is, both the parent's report of the father's occupation and the student's report are considered dependent upon the father's true occupational status. Furthermore, for both mother's and father's education, the parent's report and the children's report are considered dependent upon the true underlying educational factor. The three true-score factors are allowed to covary, and are not necessarily constrained to be equal across racial groups (although this is a constraint to be applied in later models). Covariances among response errors were initially set at zero on the assumption that response errors were random, but were subsequently allowed to covary on the assumption that specific components of measurement error in the manifest variables exist and are correlated. The statistical strategy available for selecting a best-fitting model consists of (1) estimating a model in which certain parameters are constrained to be equal, sometimes within one racial group, and sometimes across groups; and (2) estimating a less constrained version of the same model. The test consists of assessing the statistical significance of the improvement in fit going from the constrained to the less constrained model. Such model-fitting techniques are available in LISREL-V (Joreskog and Sorbom, 1981), which was used to estimate the parameters in the models being analyzed here.

In addition to the statistical criteria applied in the search for a best-fitting model, substantive criteria were applied as well. In particular, no model was accepted that implied children reported their parental socioeconomic characteristics with less error than exhibited by

the parents themselves. In such cases (and one was found), the model was respecified such that the estimated parameters for parents and children were set equal to each other.

RESULTS

This section presents a series of distinct hierarchical measurement models. The summary goodness-of-fit statistics will be presented for these models, followed by a discussion of the parameter and reliability estimates for the model deemed to be best-fitting for these data.

In these analyses, both blacks and whites were analyzed simultaneously, but in the initial model no constraints were imposed about equality of coefficients across groups. There were 15 parameters being estimated within a racial group for this first model. These parameters consisted of three true-score variances and three true-score covariances. In addition, there were six disturbance or error variances, one for each of the six manifest variables. Finally, there were three factor loadings that related one of the two manifest indicators to each latent factor. For each latent factor, one factor loading was set a priori to unity in order to provide a metric for the latent factor, and incidentally to identify the model. The goodness-of-fit chi-square statistic for this model (Model A) is shown in Table 2. The likelihood ratio chi-square for Model A was 35.52 with 12 degrees of freedom, indicating that the model as initially specified did not adequately reproduce the observed covariance matrices.

Insert Table 2 About Here

Model A implicitly assumed that the reporting errors for parents and their children were randomly distributed. Since the model did not provide an adequate fit to the data, it became necessary to consider some alternative models. One such model would consider the possibility that the reporting errors were nonrandom. One form of nonrandomness would exist if error covariances were nonzero; for example, if a child knew one parent's education but not the other, he or she could guess the unknown with reference to the known.

The latest version of LISREL (Joreskog and Sorbom, 1981) provides a powerful tool for detecting model parameters, which if set free will improve the fit of a model. An examination of the modification indices for Model A indicated that the error covariance between the children's reports of mother's and father's education should be set free. Permitting this single error covariance to be a free, estimable parameter for both whites and blacks resulted in a significant improvement in the fit of the model. These results are shown in Model B of Table 2. The difference in chi-square coefficients for Model A and B is itself distributed as chi-square. This value was 26.44 with 2 degrees of freedom, and indicates that allowing these error terms to covary resulted in a significant improvement in the fit of the model. An examination of the modification indices for Model B indicated that the error covariance for the parent's report of mother's and father's education could also be set free, but when this was done the improvement in fit was not statistically significant. As a result, Model B was accepted on statistical grounds as the best-fitting model for these data.

Nevertheless, Model B may not be the most parsimonious model for these data. An examination of the parameter estimates in Model B, shown in Table 3, reveals the fact that several of the lambda coefficients are nearly equal in value. In the first instance, it may be that the factor pattern for whites is equal to that of blacks. This hypothesis, if true, would indicate that unit increases in true scrores led to the same increments in manifest variables among blacks as for whites. This hypothesis was tested by constraining the lambda coefficients for whites and blacks to be equal; if these constraints do not significantly erode the fit of the model to the data, we may conclude that whites and blacks have a common factor pattern for these variables. The chi-square value for this model (Model C in Table 2) was 11.39; this value may be compared to the chi-square coefficient for Model B to see if Model C fits the data as well as Model B within sampling error limits. The difference in chi-square coefficients is 2.31 with 3 degrees of freedom, which has an associated probability of .511. We may conclude that black and white parents and high school senior children have a common factor pattern in their reports of parental status characteristics.

Insert Table 3 About Here

Having established that whites and blacks have a common factor pattern, we may now determine if high school senior children report their parents' status characteristics as accurately as do their parents. To accomplish this, further constraints were placed on the model; the

lambda coefficients for the children's report of each status characteristic were constrained to be equal to those of the parents. This constraint implies that the regression slopes of the manifest measures on the latent true score for parents and children were equal. The chi-square value for this model (Model D in Table 2) was 17.18; as before, this value may be compared to the chi-square coefficient from Model C to see if Model D fits the data as well as Model C within sampling error limits. The difference in chi-square coefficients is 5.79 with 3 degrees of freedom, which has an associated probability of .122. We may conclude that the regression slopes that relate the parents' reports of their socioeconomic characteristics are equal within sampling error limits to the regression slopes that relate the children's reports of their parents' socioeconomic characteristics.

While the regression slopes that relate manifest measures of background socioeconomic variables to their true scores are apparently the same for parents and their high school senior children, and apparently the same for blacks and whites, there may remain additional forms of invariance in the general measurement model. In particular, it is of substantive interest to examine whether the measurement error variances are the same across racial groups, and within groups whether they are the same for the reports of parents and children. It would be unnecessarily tedious to present all of the intermediate models that led to the acceptance of Model E. Suffice it to say that within each racial group and within each socioeconomic trait, the error variances were constrained to be equal for parents and children. After each successive

constraint, the fit of the model was tested; if the fit did not deteriorate significantly, the constraint was retained; if the fit did deteriorate significantly, the constraint was rejected. Furthermore, constraints were also placed across groups, in which the error variances for white parents were set equal to the error variances for black parents, and then those of white children were set equal to those of black children. One exception to these procedures developed when the error variance for the white parent's report of father's occupation was found to be significantly less than that of the child. This result was substantively implausible, and the model was reestimated with the stipulation that these error variances were identical, which merely implies that the reliability of the parent's report of the father's occupation was equal to the reliability of the child's report.

The parameter estimates for Model E are shown in Table 4. Comparing these coefficients to those shown in Table 3 will reveal some of the constraints made in Model E. First, all true score variances and covariances are equal for whites and blacks. Second, all lambda coefficients were found within sampling error limits to be unity. Third, the error variances (and hence the reliability estimates, since the true score variances and lambda coefficients have already been found to be equal across groups) for white parents and black parents have been found to be equal. This finding, however, does not extend to the reports of white and black high school seniors; the errors with which black high school seniors report their parents' socioeconomic characteristics were consistently larger in value than those of white high

school seniors. Correspondingly, the reliability coefficients for black children were less than those of whites. Moreover, save for the reports of white children of their father's occupation, it was found that children reported their parents' socioeconomic traits with greater error than their parents, and hence their reliability coefficients were less in value.

Insert Table 4 About Here

CONCLUSION

Models of educational achievement often include measures of socioeconomic background. Manifest measures of these variables are often obtained retrospectively from children, and not from the parents themselves. If, however, the children report these variables with substantial error, substantive conclusions about the effects of such variables will be affected.

Previous investigations indicate for the most part that children report parental statuses almost as accurately as do the parents. Bieiby, Hauser and Featherman (1977) found that men reported their own status as reliably as they reported their father's education and occupation. Corcoran (1980) reached the same conclusion about the reports of women. Mason, et al. (1976) concluded for both whites and blacks that the reports of twelfth-grade children were as reliable as the reports of their parents; and when Mare and Mason (1980) explicitly tested their previous impression, they reached the conclusion for whites that the reports of parents and twelfth-grade children were identically reliable.

The results of the present investigation vary somewhat from the previous studies. First, while the regression slopes that relate manifest measures to their true scores (lambda coefficients) are the same for parents and children, the residual error variances are not equal. Thus, the present investigation finds in general that the reliability coefficients for children are significantly smaller in value than the reports of the parents.

Furthermore, while previous studies have in general not found significant covariances among reporting errors of background variables, the present investigation uncovered the existence in relative terms of a fairly large covariance between the children's reporting errors of mother's and father's education. In the HSB survey the high school seniors have apparently reported their parents' educational attainment with greater consistency than warranted in fact. Yet the varying conclusions about the existence of correlated errors are more superficial than real. Wolfle and Robertshaw (1983) found correlated errors in high school seniors' reports of parental education, but attributed the correlation to the parallel-form question used in the NLS questionnaire (see Levinsohn, et al., 1978). Moreover, Mare and Mason (1980) reported correlated errors between mother's and father's education for sixth and nineth graders, but not for twelfth graders; and Bielby, et al. (1977) reported correlated errors for blacks between father's education and respondent's education. The evidence therefore seems persuasive: when asking respondents to report parental education, they have a tendency to make these reports with greater consistency than warranted in fact.

The present investigation also found that parental education was reported more reliably than the father's occupation. This result parallels similar findings by Bielby, et al. (1977) and Woifle and Robertshaw (1983), but does not agree with either Mason, et al. (1976) or Mare and Mason (1980), who found in general that father's education, mother's education, and father's occupation were reported with equal reliability.

Bowles (1972) has argued that using respondents' reports of parental socioeconomic status underestimates to a serious degree the influence of origin variables. In contrast, Jencks, et al. (1972) have argued that random measurement error is of relatively little importance. It would seem, in conclusion, that neither position is correct. Random measurement error among children's reports of parental status is neither trivial nor is it as serious as some have believed. Yet caution is indeed warranted, for the usual assumption about measurement error is that it is random; but significant covariances were found here between reports of father's and mother's education. Moreover, in most of the covariance structural analyses cited in this paper, some nonrandom errors were reported.

Table 1. Correlations, Means, and Standard Deviations for Measurement Model of Parental Socioeconomic Status; High School and Beyond, 1980.

	Variables *					
	X_1	X_2	X_3	X_4	X_5	X_6
X_1	----	.678	.669	.559	.440	.451
X_2	.710	----	.625	.576	.434	.405
X_3	.580	.617	----	.830	.635	.593
X_4	.572	.614	.909	----	.560	.615
X_5	.411	.440	.604	.586	----	.828
X_6	.415	.452	.592	.599	.874	----
Means						
Blacks	38.630	40.167	3.162	3.192	3.071	3.212
Whites	45.260	43.916	3.626	3.558	3.073	3.073
Standard Deviations						
Blacks	22.592	24.328	2.142	2.198	1.831	2.037
Whites	22.499	22.009	2.207	2.263	1.760	1.856

* Correlations for blacks are reported above the diagonal; correlations for whites are reported below the diagonal. The variable labels are defined as follows: X_1 = parent's report of father's occupation, X_2 = child's report of father's occupation, X_3 = parent's report of father's education, X_4 = child's report of father's education, X_5 = parent's report of mother's education, and X_6 = child's report of mother's education.

Table 2. Goodness-of-Fit Statistics for Measurement Models of Parental Socioeconomic Status

Model	X^2	Degrees of Freedom	Prob.	ΔX^2	Degrees of Freedom	Prob.
A. No error covariances	35.52	12	.000			
B. Covariance among errors of father's and mother's education for white and black children	9.08	10	.524	26.44	2	.000
C. Equal lambda coefficients for whites and blacks	11.39	13	.578	2.31	3	.511
D. Equal lambda coefficients for whites and blacks, parents and children	17.18	16	.374	5.79	3	.122
E. Model D plus equal true-score variance-covariance matrix, error variances equal for black and white parents, and for whites equal error variance for father's occup. for parents and children	29.58	26	.285	12.40	10	.259

Table 3. Model B Parameter Estimates

Socioeconomic Characteristic	Informant	True Score Variance ϕ	Error Variance Θ_δ	Slope λ
Father's Occupation	Wh. Parent	336.38	169.82	1.00
	Wh. Child		116.77	1.04
	Bl. Parent	365.48	144.91	1.00
	Bl. Child		212.08	1.02
Father's Education	Wh. Parent	4.51	0.36	1.00
	Wh. Child		0.56	1.01
	Bl. Parent	4.38	0.20	1.00
	Bl. Child		1.34	0.89
Mother's Education	Wh. Parent	2.74	0.35	1.00
	Wh. Child		0.48	1.04
	Bl. Parent	2.95	0.41	1.00
	Bl. Child		0.92	1.04

True Score Covariances *

	1.	2.	3.
1. Father's Occ.		32.17	18.85
2. Father's Educ.	28.82		2.49
3. Mother's Educ.	16.54	2.33	

* Blacks above diagonal; whites below.

Covariance between Errors in Children's Report of Mother's and Father's Education

Whites	.093
Blacks	.414

Table 4. Model E Parameter Estimates

Socioeconomic Characteristic	Informant	True Score Variance ϕ	Error Variance Θ_δ	Slope λ	Reliability $\lambda^2\phi / (\lambda^2\phi + \Theta_\delta)$
Father's Occupation	Wh. Parent	352.84	143.72	1.0	.71
	Wh. Child		143.72	1.0	.71
	Bl. Parent		143.72	1.0	.71
	Bl. Child		208.97	1.0	.63
Father's Education	Wh. Parent	4.50	0.35	1.0	.93
	Wh. Child		0.57	1.0	.89
	Bl. Parent		0.35	1.0	.93
	Bl. Child		1.23	1.0	.79
Mother's Education	Wh. Parent	2.86	0.29	1.0	.91
	Wh. Child		0.54	1.0	.84
	Bl. Parent		0.29	1.0	.91
	Bl. Child		1.03	1.0	.74

True Score Covariances *

	1.	2.	3.
1. Father's Occ.		29.62	17.21
2. Father's Educ.	29.62		2.37
3. Mother's Educ.	17.21	2.37	

* Blacks above diagonal; whites below.

Covariance between Errors in Children's Report of Mother's and Father's Education

Whites	.100
Blacks	.398

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